

COURSE TITLE:

Foundations of Energy

UNIT TITLE:

Nonrenewable - Nuclear

SECTION 1: General Information and Overview

Grade Level:

9-12

Suggested Number of Lessons:

9-10

Suggested Time to Complete Unit:

2 weeks 10 classes

Unit Overview:

In this unit topics of discussion will focus on the application of mining, milling, processing of Uranium fuel and will include atomic structure, nuclear fission, forms of radiation, decay, protection, uses, advantages and disadvantages of nuclear energy.

SECTION 2: Essential Questions

1.	Why is the use of nuclear energy to generate electricity such a viable option in Kentucky?
2.	What are the advantages and disadvantages of nuclear energy?
3.	What is the process to license the building and operation of a nuclear power plant?

SECTION 3: Major Focus

Technical Content CTE Program of Studies	Learner Activities (Enabling Knowledge and Skills/Processes)	Core Content For Assessment	Academic Expectations
Construction Technology KOSSA Standard AD-002: Demonstrate the ability to learn new processes and steps. 2.1-- Assess the impact of various current and new technologies on the economy.	Using the PDF files in the <i>Nuclear unit</i> , research and discuss current and new policies in the nuclear industry; current trends and the impact on our nation's energy portfolio and economy at the state and national levels.	SC-HS-1.1.2 Students will understand that the atom's nucleus is composed of protons and neutrons that are much more massive than electrons. When an element has atoms that differ in the number of neutrons, these atoms are called different isotopes of the element.	2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
Construction Technology KOSSA Standard AD-003: Implement new processes given oral instructions.	Using the resource files on the CD <i>Foundations of Energy</i> , develop a presentation on the new and emerging technologies researched on nuclear energy.	SC-HS-4.6.11 Students will: • explain the difference between alpha and beta decay, fission and fusion;	2.2 Students identify, analyze and use patterns such as cycles and trends to understand past and present events and

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<p>2.1-2.3--Engaging in meaningful hands-on, minds-on conceptual based activities in the area of energy technologies.</p> <p>6.2--Map the major sources of energy in Kentucky.</p>	<p>Information will be assessed in the activity <i>Nuclear Bingo</i>.</p> <p>Read information provided in the <i>Student Guide Backgrounder</i> and identify current and new nuclear policies. Record in class notebook.</p> <p>Review a map of the US; mark locations of current nuclear/uranium facilities and mark potential locations of nuclear facilities.</p>	<ul style="list-style-type: none"> • identify the relationship between nuclear reactions and energy. <p>Nuclear reactions convert a fraction of the mass of interacting particles into energy, and they can release much greater amounts of energy than atomic interactions. Fission is the splitting of a large nucleus into smaller pieces. Fusion is the joining of two nuclei at extremely high temperature and pressure. Fusion is the process responsible for the energy of the sun and other stars.</p> <p style="text-align: right;">DOK 2</p>	<p>predict possible future events.</p>
<p>Construction Technology KOSSA Standard EA-005: Display initiative.</p>	<p>Using the resource CD <i>Foundations of Energy</i> and the <i>Nuclear Bingo</i> activity, explore energy around the world, share findings with class on the review of public perspectives and laws, investigate findings regarding societal and global issues with nuclear energy.</p>	<p>SC-HS-4.6.12 Students will understand that the forces that hold the nucleus together, at nuclear distances, are usually stronger than the forces that would make it fly apart.</p>	<p>2.4 Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.</p>
<p>Construction Technology KOSSA Standard AC-002: Students will identify methods of planning that will save costs on time and materials.</p>	<p>Using the <i>Nuclear Student Guides</i> student explore the medical and the non-biological uses of radiation.</p> <p>Use the information for the M&M activities from the student guide to develop a report on radioactive decay and graph using the Twizzlers model.</p>	<p>SC-HS-4.7.2 Students will:</p> <ul style="list-style-type: none"> • evaluate proposed solutions from multiple perspectives to environmental problems caused by human interaction; • justify positions using evidence/data. <p>Human beings live within the world's ecosystems. Human activities can deliberately or inadvertently alter the dynamics in ecosystems. These activities can threaten current and future global stability and, if not</p>	<p>2.6 Students understand how living and nonliving things change over time and the factors that influence the changes.</p>

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		addressed, ecosystems can be irreversibly affected. DOK 3	
2.6-- Demonstrate employability and social skills relative to careers in energy.	<p>Develop a power point of 12-15 slides of the research and findings of the nuclear power industry, with associated careers and the economic impact nuclear energy has on the state and nation.</p> <p>Develop a 2-3 page report on a specific career related directly to the nuclear industry.</p>	<p>SC-HS-4.7.3 Students will: --predict the consequences of changes to any component (atmosphere, solid earth, oceans, living things) of the earth system; --Propose justifiable solutions to global problems. Interactions among the solid earth, the oceans, the atmosphere and living things have resulted in the ongoing development of a changing earth system. DOK 3</p>	

SECTION 4: Culminating Project with Guide Scoring Students

Work in pairs to role play the stakeholders of a Nuclear Regulatory Commission Hearing for the site and building of a nuclear power plant.

SCORING GUIDE:

CATEGORY	4	3	2	1
CONTENT	EXTENSIVE- KNOWLEDGE OF THE IMPLICATIONS OF THE BUILDING AND OPERATION OF A NUCLEAR POWER PLANT	GOOD- KNOWLEDGE OF THE IMPLICATIONS OF THE BUILDING AND OPERATION OF A NUCLEAR POWER PLANT	BASIC – KNOWLEDGE OF THE IMPLICATIONS OF THE BUILDING AND OPERATION OF A NUCLEAR POWER PLANT	LIMITED- KNOWLEDGE OF THE IMPLICATIONS OF THE BUILDING AND OPERATION OF A NUCLEAR POWER PLANT
RESEARCH	EXTENSIVE- UNDERSTANDING OF THEIR ROLE IN THE MOCK HEARING	APPROPRIATE- UNDERSTANDING OF THEIR ROLE IN THE MOCK HEARING	BASIC-UNDERSTANDING OF THEIR ROLE IN THE MOCK HEARING	LIMITED – UNDERSTANDING OF THEIR ROLE IN THE MOCK HEARING
ROLE PLAYING	EXCELLENT- USE OF DIALOGUE, POSITIVE ATTITUDE, PRESENTING ROLE	GOOD – USE OF DIALOGUE, POSITIVE ATTITUDE, PRESENTING ROLE	BASIC - USE OF DIALOGUE , GOOD ATTITUDE, LACKS ADEQUATE PRESENTING OF ROLE	LIMITED- USE OF DIALOGUE, LACKS ATTITUDE, POOR PRESENTING OF ROLE

SECTION 5: Assessment and Enabling Skills and Processes

Assessment:	Testing and quizzes as needed. Participation in NRC hearing and preparation.
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SECTION 6: Support Materials (i.e., Resources, Technology, and Equipment)

A. Resources	NEED <i>Secondary INFO book</i> , NEED Nuclear Curriculum and Nuclear Kit, Twizzlers model
B. Technology	
C. Websites (samples of many available)	Department of Energy, www.doe.gov ; Nuclear Energy Institute, www.nei.org Energy Information Administration, www.eia.gov
D. Equipment	